United States Patent [19]

Gallo, Jr.

[11] **3,886,416**

[45] **May 27, 1975**

[54] **METHOD AND APPARATUS FOR ADJUSTING COROTRON CURRENTS**

[75] Inventor: **Charles F. Gallo, Jr.**, Penfield, N.Y.

[73] Assignee: **Xerox Corporation**, Stamford, Conn.

[22] Filed: **Dec. 7, 1973**

[21] Appl. No.: **422,632**

[52] **U.S. Cl.** ..... **317/262 A**

[51] **Int. Cl.** **G03g 15/02**

[58] **Field of Search** ..... 317/4, 262 A

[56] **References Cited**

UNITED STATES PATENTS

3,778,623	12/1973	Sato et al.	317/262 A
3,800,153	3/1974	Matsumoto et al.	317/262 A
3,809,974	5/1974	Gange et al.	317/262 A

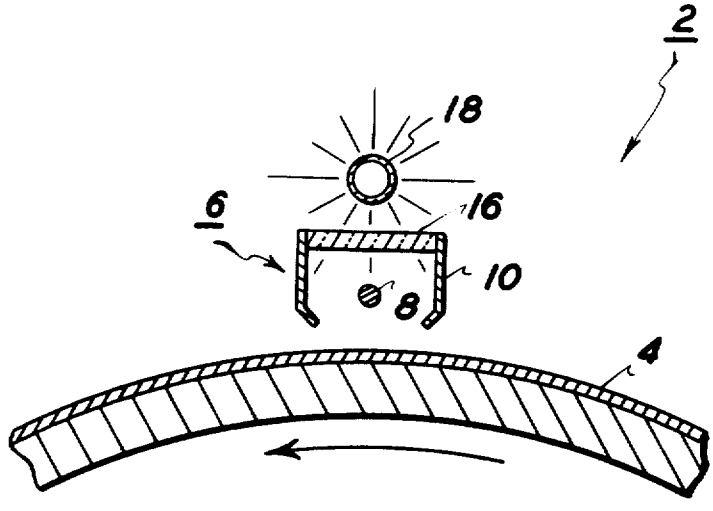
Primary Examiner—L. T. Hix

Attorney, Agent, or Firm—Robert J. Bird

[57] **ABSTRACT**

A corona generating apparatus for charging a photoconductive surface is disclosed. In order to adjust the corona current, the corona discharge apparatus is provided with a light for illumination of the photoconductive surface when corona current is to be tested or adjusted. The lamp is energized during test to put the photoconductor into the conductive state.

3 Claims, 2 Drawing Figures



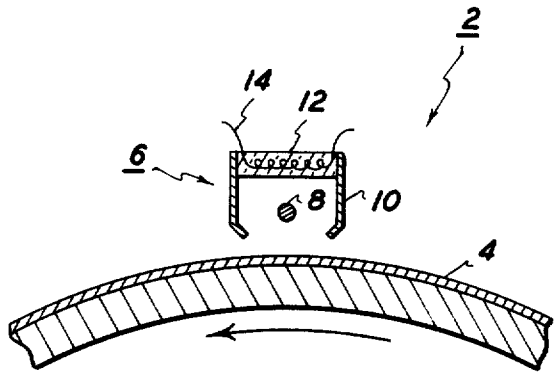


FIG. 1

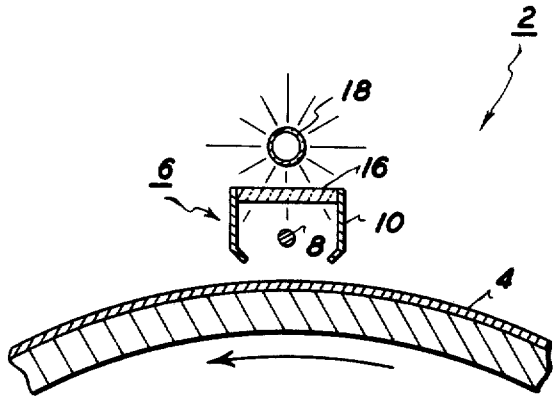


FIG. 2

METHOD AND APPARATUS FOR ADJUSTING COROTRON CURRENTS

BACKGROUND

This invention relates to the field of xerography and particularly to an improved corona generating device for charging xerographic photoconductive surfaces which simplifies the measurement and adjustment of the corona emission current between the generating device and the photoconductive surface.

Generally, in xerography, a uniform electrostatic charge is applied to a photoconductive surface and the surface is then exposed whereby the selective discharging of the photoconductor leaves a latent electrostatic image of the original object on the surface. Typically, the electrostatic charge is applied to the photoconductive surface by means of a corona current. In such an arrangement, the corona generating device is placed near the xerographic photoconductive surface to be charged and ions generated around the corona wire flow to the surface developing an electrostatic charge thereon.

It is essential to proper operation that the corona current between wire and xerographic surface be accurately adjusted in order that the applied electrostatic charge be brought to its proper level. In order to maintain the operation of these corona generating devices within specifications, it is the general practice to periodically adjust the "bare plate" current between the corona wire and a bare metallic conductor. Since a xerographic photoconductive surface, in a darkened machine environment, is not a conductor, this procedure is usually followed by removing the xerographic surface or drum and inserting in its place a bare metallic conductive fixture. The bare plate current is then adjusted to the desired value. The fixture is then removed and the photoconductive drum or surface replaced.

This whole procedure is very time consuming, especially so because of the large number of corona generators in some xerographic machines. The procedure is also cumbersome and may result in damaged photoconductors, particularly in some compact machines. In addition, the tolerances for the fixture are very critical since the distance between corona wire and drum or surface is a critical dimension. Finally, the fixtures are expensive, large, and cumbersome and inconvenient for service personnel to carry on service calls.

SUMMARY OF THE INVENTION

It is an object of the present invention to enable a simple, fast, and accurate measurement of the bare plate current between corona wire and xerographic drum with the drum in situ, thus eliminating the time, potential damage, inconvenience, and possible inaccuracies of prior methods.

Briefly, this invention is practiced in one form by a corona generating wire with associated shield in operative position relative to a xerographic drum or surface. The corona shield is either partly transparent to an external light source to admit light to the photoconductor, or includes a light source as an integral part thereof for the purpose of illuminating the photoconductor. By illuminating the photoconductor during test, it becomes fully conductive so that the bare plate current to it from the corona wire can be measured and adjusted.

For a better understanding of this invention, reference is made to the following detailed description given in connection with the accompanying drawing.

DRAWING

FIG. 1 is a somewhat schematic view of a corona generator and xerographic drum according to one embodiment of this invention.

FIG. 2 is a view similar to FIG. 1 of an alternative embodiment of this invention.

DESCRIPTION

Referring now to FIG. 1, the environment of this invention in a xerographic apparatus is represented generally at 2 and includes a xerographic photoconductive surface or drum 4 and a corona generator 6 in operative position relative to each other. Drum 4 and generator 6 are suitably mounted in a frame which is not shown, not being material to this invention except insofar as it maintains a light-tight enclosure for the photoconductor.

Corona generator 6 includes a corona wire 8 which extends parallel to the surface of the drum 4 and a corona shield 10 to control and direct the corona current flow onto surface 4. Forming a part of corona shield 10 is an integral electroluminescent lamp, schematically represented at 12 and suitably connected to an energy source, such as by a lead wire 14.

In normal operation of this apparatus in a xerographic machine, the electroluminescent lamp is off and the photoconductor in the dark so that the corona generator is capable of applying charge to the insulative surface of the photoconductive drum 4. When it is desired to adjust the bare plate current, the lamp 12 is turned on and the illumination from the lamp discharges the photoconductor 4 and keeps it discharged and in a conductive state. In this condition, the current from the operating corona generator 6 is the desired bare plate current. When the adjustment of this current is made, the lamp 12 is turned off and the machine is again ready for normal use.

Referring now to FIG. 2, the apparatus shown is similar to that in FIG. 1 except that the corona shield 10 includes an integral transparent member 16 which may be composed of an insulator such as glass or plastic or a conducting material such as NESA glass. A lamp 18 is suitably mounted externally of the corona shield 10 and adjacent to the transparent window so that its illumination can be directed onto the photoconductive drum 4.

The operation of the embodiment shown in FIG. 2 is the same as that in FIG. 1. The FIG. 1 embodiment occupies less space, and this may be an important factor in a machine.

It will be apparent from the foregoing that a method and apparatus have been herein disclosed which greatly simplifies the adjustment of bare plate current in a xerographic charging apparatus. The adjustment procedure is simplified by reducing the time involved and the hardware required, and improved by eliminating the possibility of damage and increasing reliability of the adjustment.

The foregoing description of two embodiments of this invention is given by way of illustration and not of limitation. The concept and scope of the invention are limited only by the following claims and equivalents thereof which may occur to others skilled in the art.

What is claimed is:

1. An apparatus for applying electrostatic charge to a photoconductive surface, including:

a corona generator, including a corona electrode operatively disposed within a corona shield, to emit corona current,

a photoconductive surface disposed adjacent to said corona generator to receive said corona current and thus to acquire electrostatic charge when in an insulative condition,

said apparatus including means to establish a steady corona current from said corona electrode to said photoconductive surface, said means including a lamp, integral with said corona shield, said lamp being operative to illuminate said photoconductive surface to render the same conductive for the establishment of said steady corona current, and said lamp being inoperative to allow said photoconductive surface to acquire electrostatic charge.

2. An apparatus for applying electrostatic charge to a photoconductive surface, including:

a corona generator, including a corona electrode operatively disposed within a corona shield, to emit corona current,

a photoconductive surface disposed adjacent to said corona generator to receive said corona current and thus to acquire electrostatic charge when in an insulative condition,

said apparatus including means to establish a steady corona current from said corona electrode to said photoconductive surface, said means including a lamp associated with and external to said corona shield, said corona shield being transparent between said lamp and said photoconductive surface, said lamp being operative to illuminate said photoconductive surface to render the same conductive for the establishment of said steady corona current, and said lamp being inoperative to allow said photoconductive surface to acquire electrostatic charge.

3. A method of maintaining a steady corona current between a corona generator and a photoconductive surface in a xerographic apparatus for the testing and adjustment of said corona current, including the steps of:

illuminating said photoconductive surface in situ to discharge said photoconductive surface and maintain said photoconductive surface in a conductive state,

operating said corona generator to establish corona current between said generator and said photoconductive surface.

* * * * *